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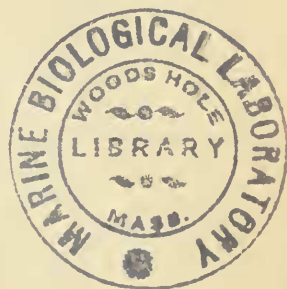
No. 4

SUBLITTORAL MARINE ALGAE OF THE
MONTEREY PENINSULA

BY

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NUMEROUS INVESTIGATIONS have been made on the marine algae of the Pacific Coast of North America but attention has been directed almost exclusively to those collected in the intertidal zone. Statements concerning sublittoral algae (those growing below extreme low tide level) have been based upon the assumption that algae found cast ashore on the beach and not known to grow locally in the intertidal zone must have come from deep water. Here and there in the literature is mention of a few algae dredged along the western shores of North America. The only exception is the region in the vicinity of Friday Harbor, Washington, where there has been an intensive exploration by dredging. Of the 126 species of red algae that Kylin (1925) records from this area, 75 were found only in the intertidal zone, 33 were found only by dredging, and 18 were found both in the intertidal zone and in deep water (5-10 fathoms).

For several years I have been engaged upon a survey of the marine algae of the Monterey Peninsula, California. In addition to collecting intensively in the intertidal zone, numerous collections have been made from a depth of 15-60 feet below the extreme low tide level. At the time this investigation was commenced the only definite records of sublittoral algae from the Monterey Peninsula were the following: *Dictyoneuropsis reticulata* (Saund.) G. M. Smith by Saunders (1895); *Myriogramme spectabilis* (Eaton) Kylin by Nott (1900); *Macrocystis pyrifera* (L.) C. A. Ag. and *Nereocystis Luetkeana* (Mert.) Post. and Rupr. by McFarland (1912); and *Lithothamnion montereyicum* Foslie by Foslie (1906).

The first collections from the sublittoral by the writer were made with the assistance of three students (Vernon Brock, Charles Danforth, and Herbert Armstrong) in the summer of 1934. By means of a diving helmet, several algae were collected from a depth of 15–35 feet in the vicinity of Mussel Pt. Since 1934 all collections from deep water have been by dredging from a small boat equipped with a 20-horsepower engine. The only really favorable place for dredging is the submerged shale reef lying at a depth of 30–35 feet a quarter mile east of the municipal wharf at Monterey. Here the rock is so soft that large pieces of rock with algae attached to them are broken loose by the dredge. Elsewhere on the Monterey Peninsula the rock on the ocean bottom is granitic and it is extremely difficult to break off pieces with the dredge. Here, also, the ocean bottom is so rough that the dredge is continually catching between the rocky crags, and on any dredging expedition one can expect to spend at least half the time trying to dislodge the dredge. In spite of these difficulties the sublittoral region between Mussel Pt. and Pt. Pinos has been rather thoroughly explored. So, also, has the land-locked cove (Stillwater Cove) adjoining Pebble Beach. No attempt has been made to dredge between Pt. Pinos and Cypress Pt. because of the danger in taking a small boat close to the shore in this wave-swept portion of the coast line.

When blades of algae are found loose in the dredge there is always the problem of distinguishing between those from plants growing in the sublittoral and those broken off from intertidal plants and lying unattached on the ocean bottom. For this reason every effort was made to obtain intact plants attached to pieces of rock and thus know with certainty that the alga is from the sublittoral. In the following list of algae from the sublittoral one or more specimens of all the species have been found attached to rock dredged from the ocean bottom. Some of the algae brought up by the dredge are not found in the intertidal zone of the Monterey Peninsula, or are known only from isolated individuals collected there. These are considered true sublittoral algae. Other of the algae are regularly found in the intertidal zone. These are interpreted as algae the upper limit of whose vertical distribution is approximately the mean low tide level. For the sake of comparison the occurrence or non-occurrence in the intertidal zone of the Monterey Peninsula is given for each of the species, as is also the intertidal range with respect to mean low tide level.

PHAEOPHYTA

ECTOCARPALES

Ectocarpus granulosus (J. E. Smith) C. A. Ag. At 30–35 feet near municipal wharf, Monterey; at 15–20 feet, Stillwater Cove. Common between the 0.5 and –1.5 foot tide levels.

SPHACELARIALES

Sphacelaria didichotoma Saund. At 15–20 feet, Stillwater Cove. Known from the intertidal zone.

DESMARESTIALES

Desmarestia linearis Gardner. mss. At 60 feet near Monterey. Not known from the intertidal zone.

Desmarestia herbacea (Turn.) Lmx. At 30–35 feet near municipal wharf, Monterey. Common between the 0.5 and –1.5 foot tide levels.

PUNCTARIALES

Stictyosiphon tortilis (Rupr.) Reinke. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

LAMINARIALES

Dictyonium californicum Rupr. At 25 feet near Mussel Pt.; at 15–20 feet, Stillwater Cove. Common between the 0.5 and –1.5 foot tide levels.

Dictyonuopsis reticulata (Saund.) G. M. Smith. At 30–35 feet near municipal wharf, Monterey; at 20–25 feet near Pt. Aulon. Not known from the intertidal zone.

Nereocystis Luetkeana (Mert.) Post. and Rupr. Numerous beds growing at a depth of 30–50 feet. Isolated plants found between the 0.0 and –1.5 foot tide levels.

Macrocystis pyrifera (L.) C. A. Ag. Numerous beds growing at a depth of 30–50 feet. Not known from the intertidal zone.

Pterygophora californica Rupr. Growing in extensive stands at a depth of 20–60 feet between Cypress Pt. and Pescadero Pt. Isolated plants found between the 0.0 and –1.5 foot tide levels.

FUCALES

Cystoseira osmundacea (Menzies) C. A. Ag. At 20–35 feet near Mussel Pt. and near Pt. Aulon. Common between the 0.0 and –1.5 foot tide levels.

RHODOPHYTA

BANGIALES

Goniotrichum elegans (Chauv.) Zanard. At 35–40 feet near municipal wharf, Monterey; at 25–30 feet near Mussel Pt.; at 20–25 feet near Pescadero Rock. Isolated plants collected at mean low tide level.

Goniotrichopsis sublittoralis G. M. Smith. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

Erythrotrichia carnea (Dillw.) J. G. Ag. At 30–35 feet near municipal wharf, Monterey, and near Pt. Aulon. Common between the 2.0 and –1.5 foot tide levels.

NEMALIONALES

Rhodochoriton concreescens Drew. At 25–30 feet near Pt. Aulon; at 35–40 feet near Pt. Pinos. Known from the mean low tide level.

Rhodochoriton Amphiroae Drew. At 25–30 feet near Pt. Aulon. Known from the mean low tide level.

CRYPTONEMIALES

Pikea pinnata Setch. At 30–35 feet near municipal wharf, Monterey; at 35–40 feet near Mussel Pt. Isolated plants found between the 0.5 and –1.5 foot tide levels.

Pikea californica Harv. At 20–25 feet near Pt. Aulon. Widespread but scarce between the 0.0 and –1.5 foot tide levels.

Peyssonnelia pacifica Kylin. At 30–35 feet near municipal wharf, Monterey; at 20–25 feet, Stillwater Cove. Fairly common between the 0.0 and –1.5 foot tide levels.

Lithothamnion montereyicum Foslie. At 70 feet near Monterey. Not known from the intertidal zone.

Bossea Orbigniana (Dene.) Manza. At 30–35 feet near municipal wharf, Monterey; at 20–25 feet near Pt. Aulon. Not known from the intertidal zone.

Calliarthron Setchelliae Manza. At 20–25 feet near Pt. Aulon; at 30–35 feet near Pt. Pinos. Common between the 0.0 and –1.5 foot tide levels.

Halymenia californica Smith and Hollenb. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

Prionitis lanceolata Harv. At 40–60 feet near Mussel Pt.; at 20–25 feet near Pt. Aulon and at Stillwater Cove. Abundant between the 1.0 and –1.5 foot tide levels.

Callophyllis marginifructa Setch. and Swezy. At 30–35 feet near municipal wharf, Monterey; at 12–15 feet near Pt. Aulon; at 15–20 feet, Stillwater Cove. Scarce between the 0.0 and –1.5 foot tide levels.

Callophyllis megalocarpa Setch. and Swezy. At 15–20 feet near Mussel Pt. and at Stillwater Cove. Scarce between the 0.0 and –1.5 foot tide levels.

Calocolax neglectus Schmitz. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

GIGARTINALES

Schizymenia pacifica Kylin. At 30–35 feet near municipal wharf, Monterey. Common between the 0.0 and –1.5 foot tide levels.

Agardhiella Coulteri (Harv.) Setch. At 20 feet near Mussel Pt. and at Stillwater Cove. Abundant between the 1.0 and –1.5 foot tide levels.

Plocanium pacificum Kylin. At 20–25 feet near Pt. Aulon and near Pescadero Rock. Common between the 0.0 and –1.5 foot tide levels.

Gracilaria Sjoestedtii Kylin. At 30–35 feet near municipal wharf, Monterey at 40–60 feet near Mussel Pt. Abundant between the 1.0 and –1.5 foot tide levels.

Gracilaria robusta Setch. At 15–25 feet near Pt. Aulon. Isolated plants found between the –0.5 and –1.5 foot tide levels.

Ahnfeltia gigartinoïdes J. A. Ag. At 12–15 feet near Pt. Aulon. Not known from the intertidal zone.

Stenogramma californica Harv. At 30–35 feet near municipal wharf, Monterey; at 20–25 feet near Pt. Aulon. Relatively scarce between the 0.5 and –1.5 foot tide levels.

Gigartina Boryi Setch. and Gardn. At 12–15 feet near Pt. Aulon. Common between the 1.0 and –1.5 foot tide levels.

Gigartina corymbifera (Ktz.) J. G. Ag. At 20–25 feet near Mussel Pt. and at Stillwater Cove. Common between the 0.0 and –1.5 foot tide levels.

Gigartina Harveyana (Ktz.) Setch. and Gardn. At 25 feet near Pt. Aulon. Common between the 1.0 and –1.5 foot tide levels.

RHODYMENTALES

Rhodymenia californica Kylin. At 20–25 feet near Pt. Aulon and at Stillwater Cove. Common between the 0.0 and –1.5 foot tide levels.

Rhodymenia pacifica Kylin. At 60–75 feet near Mussel Pt.; at 15–20 feet, Stillwater Cove. Common between the 0.0 and –1.5 foot tide levels.

Gastroclonium Coulteri (Harv.) Kylin. At 20–25 feet near Mussel Pt.; at 15–20 feet, Stillwater Cove. Abundant between the 2.0 and –1.5 foot tide levels.

Coccoloseira compressa Hollenb. At 20–30 feet near Pt. Aulon. Not known from the intertidal zone.

CERAMIALES

Antithamnion defectum Kylin. At 30–35 feet near Pt. Pinos. Not known from the intertidal zone.

Antithamnion dendroideum G. M. Smith. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

Antithamnion glanduliferum Kylin. At 30–35 feet near municipal wharf, Monterey. Rare between the 0.0 and –1.5 foot tide levels.

Platythamnion heteromorphum J. G. Ag. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

Platythamnion villosum Kylin. At 30–35 feet near municipal wharf, Monterey; at 25–30 feet near Pt. Aulon. Rare between the 0.0 and –1.5 foot tide levels.

Platythamnion pectinatum Kylin. At 30–35 feet near municipal wharf, Monterey. Rare between the 0.0 and –1.5 foot tide levels.

Pleonosporium dasyoides (J. G. Ag.) DeToni. At 35–50 feet near Pt. Aulon; at 15–20 feet, Stillwater Cove. Scarce between the 0.0 and –1.5 foot tide levels.

Pleonosporium vancouverianum J. G. Ag. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

Spermothamnion Snyderae Farl. At 30–35 feet near municipal wharf, Monterey; at 35–40 feet near Mussel Pt.; at 30–35 feet near Pt. Pinos; at 20–25 feet, Stillwater Cove. Common between the 0.5 and –1.5 foot tide levels.

Griffithsia pacifica Kylin. At 25–30 feet near Pt. Aulon; at 30–35 feet near Pt. Pinos; at 20–25 feet near Pescadero Rock. Scarce between the 0.5 and –1.5 foot tide levels.

Microcladia Coulteri Harv. At 20–25 feet near Mussel Pt. and at Stillwater Cove. Abundant between the 1.0 and –1.5 foot tide levels.

Branchioglossum Woodii (J. G. Ag.) Kylin. At 30–35 feet near municipal wharf, Monterey, and near Pt. Pinos. Very rare between the –0.5 and –1.5 foot tide levels.

Polynoura latissima (Harv.) Kylin. At 30–35 feet near municipal wharf, Monterey, and near Mussel Pt.; at 12–15 feet near Pt. Aulon. Common between the 0.0 and –1.5 foot tide levels.

Phycodryx Setchellii Skotts. At 30–35 feet near municipal wharf, Monterey; at 20–30 feet, Stillwater Cove. Very rare between the 0.0 and –1.5 foot tide levels.

Nienburgia Andersoniana (J. G. Ag.) Kylin. At 20–25 feet near Pt. Aulon and at Stillwater Cove. Very scarce between the 0.0 and –1.5 foot tide levels.

Myriogramme spectabilis (Eaton) Kylin. At 20 feet near Mussel Pt.; at 70–90 feet near Pt. Aulon. Not known from the intertidal zone.

Cryptopleura violacea (J. G. Ag.) Kylin. At 30–35 feet near municipal wharf, Monterey; at 20–25 feet near Pt. Aulon; at 15–20 feet, Stillwater Cove. Abundant between the 0.5 and –1.5 foot tide levels.

Botryoglossum Farlowianum (J. G. Ag.) DeToni. At 30–35 feet near municipal wharf, Monterey; at 20–25 feet near Pt. Aulon; at 15–20 feet, Stillwater Cove. Abundant between the 0.0 and –1.5 foot tide levels.

Dasyopsis densa G. M. Smith. At 30–35 feet near municipal wharf, Monterey. Not known from the intertidal zone.

Polysiphonia californica Harv. At 20–25 feet near Pescadero Rock. Common between the 1.0 and –1.5 foot tide levels.

Polysiphonia flaccidissima var. *Smithii* Hollenb. At 35–40 feet between Mussel Pt. and Pt. Aulon. Not known from the intertidal zone.

Pterosiphonia dendroidea (Mont.) Falkenb. At 20–25 feet near Pt. Aulon and near Pescadero Rock. Abundant between the 0.0 and –1.5 foot tide levels.

Pterosiphonia Baileyi (Harv.) Falkenb. At 20–25 feet near Mussel Pt. and near Pt. Aulon. Common between the 0.5 and –1.5 foot tide levels.

Herposiphonia rigida Gardn. At 30–35 feet near municipal wharf, Monterey. Rare between the 0.0 and –1.0 foot tide levels.

Herposiphonia pygmaea Hollenb. mss. At 20–25 feet near Pt. Aulon; at 35–40 feet near Pt. Pinos. Not found in the intertidal zone.

Laurencia spectabilis Post. and Rupr. At 15–20 feet, Stillwater Cove. Abundant between the 1.0 and –1.5 foot tide levels.

Laurencia Gardneri Hollenb. At 30 feet near Mussel Pt.; at 35–40 feet near Pt. Aulon; at 30–35 feet near Pt. Pinos; at 20–25 feet near Pescadero Rock. Isolated plants found between the 0.0 and –1.5 foot tide levels.

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